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MERRY CHRISTMAS . . . a familiar greeting to us all in Canada at this festive season — so also was it to those unhappy peoples of the occupied countries before they were overrun by the oppressors. Let us remember too that with them, as with most of us, Christmas was a time for sleigh bells and wood fires, family reunions, turkey and cranberry sauce, plum pudding and presents — but they will not see these things again until we have set them free.

To thousands of Allied soldiers, Christmas 1943 means just another day in the fever-laden jungles of New Guinea, on the frozen wastes of the Russian front, or the blood-soaked soil of Italy and China.

In millions of homes, children will say "Merry Christmas" to the picture of a soldier-father who may never return. In Ottawa, the carillon in the Peace Tower will play Christmas carols from the same building that holds the Book of Remembrance containing the names of those who paid the supreme sacrifice in the First Great War.

We all have faith that we shall be victorious in this struggle but too often forget that the time until final Victory is not to be measured in days, hours and minutes, but rather in the blood of our comrades-in-arms. Every delay, of even a minute, means brave men shall die, because we falter.

Let us, therefore, decide on this Christmas Day that we shall not flag or fail, but firmly resolve from this day on to forsake personal interest and think only of hastening the victory. Let us drive quickly through the valley of death to a world of peace on earth, good will towards men; a world, not of oppression and terror, but of liberty and justice, where all men may live in harmony forever.

This is a sacred duty bequeathed to us by those who have died in all corners of a war-torn world. We must keep faith, that they may sleep safe in the knowledge that they have not died in vain, and that some day soon all the peoples of the world shall be free to enjoy a Merry Christmas.

CAM

DECEMBER - 1943
VOL. 1 No. 3

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Your contributions of articles and ideas are welcome. Address all correspondence to the Editor, **CAM**, Directorate of Mechanical Maintenance, Department of National Defence, Ottawa.

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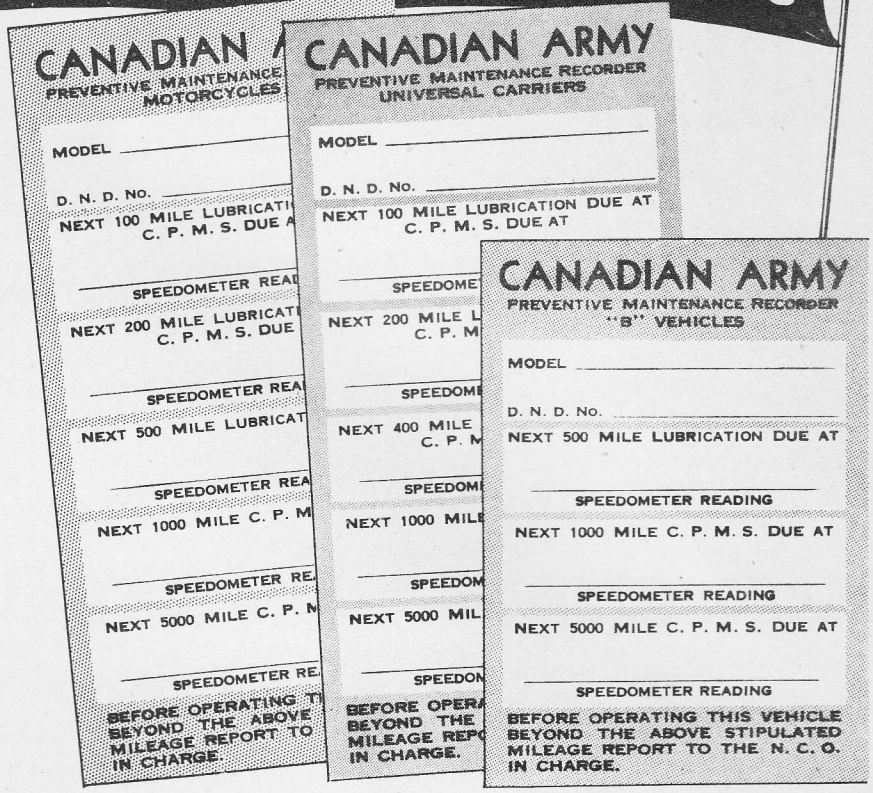
PREVENTIVE MAINTENANCE RECORDERS



Just a few words to the wise—we mean you Transport Sergeants. From information received, it is evident that your drivers of "B" Vehicles, Universal Carriers and Motorcyclists are very much off the beam in the use of these Preventive Maintenance Recorders. Maybe they don't understand what these things are for — maybe nobody ever took the trouble to tell them—so let's review the whole picture.

First of all, you know that lubrication is a regular necessity, basically governed by mileages. Of course, you also understand that in some territories lubrication is required more frequently than in others. That condition is governed by the discretion of the Officer or senior N.C.O. in charge of the transport. However, for the moment let's get back to normal operating conditions. According to the Lubrication Guides, the intervals of lubrication are clearly set out—every 100, 200, 500 or 1000 miles as the case may be, according to the type of vehicle. Now, having determined these mileages at which this lubrication must be carried out, the next point is the method of controlling these periods so that the job gets done when it's supposed to be done and not just when somebody happens to think about it. That is why the Preventive Maintenance Recorders were built into the system of Compulsory Preventive Maintenance. We're giving you an illustration of this mileage recorder in case you have never seen one yet, and while it is a very simple and effective method for doing what it's supposed to do, it isn't worth a hoot if you don't have it in the right place, and the proper figures recorded on it.

Why should you make it your personal business to see that the correct mileage figures are on the recorder? For the very good reason that the whole system of maintenance and lubrication is based on the mileages you put on the sticker, but probably the best reason is because it's for your own good—you're not likely to be driving the same vehicle for the duration—chances are you'll be moved frequently — you'll get someone else's vehicle—someone else will get yours. You want to know where you stand on your new vehicle—so does the other fellow.

Take the case of Pte. Joe Mush — he didn't give a damn about P.M. recorders. Sure he had the sticker on the windshield but he put it there just to see if it really stuck like they said it would. It contained no mileages. Joe went on furlough and Pte. Noggins took over the truck. Noggins was a clean living lad, and seeing no mileage record on the sticker asked his Sergeant how he was to tell when he might need his 500 or 1000 mile lubrications. That same day the truck cracked up — a total wreck — due to a seized steering gear. At the court of enquiry it was found that the steering box had not received lubrication for Lord knows how long. Who'se neck felt the axe? — Joe Mush's — and why not!

A darkly painted picture, but possible if you put yourself in Joe Mush's shoes.

Now let's see how this thing

works. First of all, to make these recorders easily distinguishable, they are printed on different colour paper — salmon for "B" vehicles, yellow for motorcycles and green for universal carriers. That makes it just too simple for anyone to use the wrong sticker on a vehicle. Again since "B" Vehicles, motorcycles and universal carriers are three different types of vehicles, the lubrication mileages vary.

The special adhesive on the back enables the stickers to be securely fastened to wood, metal or glass and any normal variations in temperatures do not affect them. There are instructions on the back of the sticker telling you how to handle it properly so that it stays put. Follow these instructions and you will not have any trouble with the recorders falling off and recording the mileage for a nearby ditch or a passing fence post. The idea is to fix this sticker in a prominent position where the driver will see it at all times so that it acts as a flag to give him the necessary information, and this information is plain straight-forward school boy stuff. After you've filled in the model and its DND Number in the first space, all that has to be done is to simply record on this sticker when the next operation is due according to the speedometer reading.

You arrive at this in the following manner for any "B" vehicle— check up and find out when the last 500 mile lubrication was done from the vehicle Log Book, get the mileage figure at that time, from the Monthly Vehicle Log Sheet, then add 500 to that figure, and enter the answer you get on the Maintenance Recorder in the "Next 500 mile lubrication due at" space. That tells the driver that when his speedometer reaches the figure indicated on the recorder, he must immediately report his vehicle as due for a 500 mile lubrication to the N.C.O. in charge.

Now, let's look at the next space which says "Next 1000 mile C.P.M.S. due at". You follow the same procedure as we mentioned above, only this time you add 1000 to the speedometer reading at the time the last C.P.M.S. 4, which is the 1000 mile lubrication period, was performed. Then you enter that figure in the third space over the words "Speedometer Reading". If you have not done a thousand mile C.P.M.S. operation since this Compulsory Preventive Maintenance System was introduced last March, it is time you looked into things because you are probably away over due. This procedure is then followed out on each successive occasion when an operation is done, changing the figure accordingly, or if necessary, putting on a new sticker transferring the unexpired mileage figures and entering the new figure in the proper space.

The fourth space which calls for the "Next 5000 mile C.P.M.S. due at" is a figure which will be recorded by the Ordnance Workshop personnel. However, it is still up to you to see that the vehicle gets into the workshop for the initial 5000 mile C.P.M.S. number 5. This 5000 mile check is mighty important to you, pal— just as important as the daily maintenance checks — so don't let her roll past 5000 without a workshop check. From that point, providing you have the recorder on the vehicle, the workshops will indicate by an entry in this space, at what mileage the vehicle is to be returned for a further 5000 mile inspection.

Now we would call that very simple common sense stuff. Yet reports from the field on the use of the stickers do not indicate its simplicity. Perhaps we should call it carelessness or lack of interest.

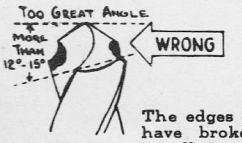
The operations for the motorcycles and the universal carriers follow along exactly the same lines except that the intervals are more frequent. Now, if we have got that part of the story across we have done something, but that isn't all. It's no use entering a figure on the recorder if nobody pays any attention to it. The responsibility for seeing that the figure is entered on the recorder is that of the N.C.O. in charge of the C.P.M.S. or lubrication operation. The responsibility for seeing that the vehicle gets back on the line for the next operation at the proper time is that of the driver, and it doesn't matter whether it is Pte. Jones, Cpl. Smith, or any other rank who is in charge of that vehicle, when the figure on the Recorder shows up on the speedometer, the palooka that's sitting behind the wheel is **the** guy who sings "Oh, Sargy, I wanna C.P.M.S. 4, fix that door, an' everything". Let's have this responsibility clearly defined and let everybody know about it. Furthermore, when the sticker calls for a check at say 2500 miles on the speedometer, it doesn't mean 2600, 2700, 2800 or maybe 3000 miles — it means just 2500 miles. Just pretend it was a buck out of your pocket for every ten miles you go over the figure it says.

There is a mail box open to you Transport Sergeants, or anybody else for that matter if we have not made everything clear. We're pretty chummy with the Quiz Kids who know **all** the answers so you won't be putting us out a bit if you write and ask questions — we've been trying to stump these guys for so long now maybe you can help us. But one thing we have got to get across is that this system must work 100% or it won't work at all. Which leaves one alternative in this man's army — **it must work 100%.**

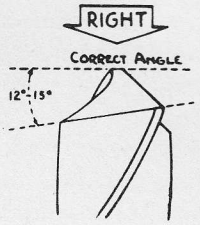
◆ ◆ ◆

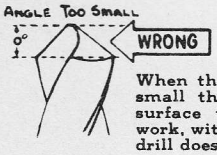
What do you know about DRILLS ?

GRIND LIP CLEARANCE CORRECTLY



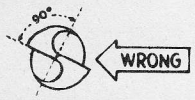
The edges of the cutting lips have broken down due to insufficient support, because the lip clearance is too great.





When the lip clearance is too small the entire cutting lip surface tends to touch the work, with the result that the drill does not cut.

CORRECT ANGLE BETWEEN LINE ACROSS DEAD CENTRE AND EDGE OF LIP



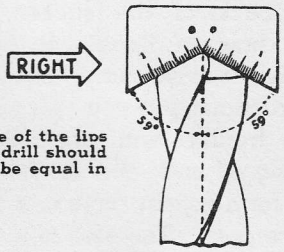
Insufficient angle causes point to act like a left hand point on a right hand drill. Drill will not enter work and builds up a pressure that often splits the drill.

Correct angle between line across dead centre and edge of cutting lip.

GRIND LIPS OR CUTTING EDGES PROPERLY

Angle of two lips are unequal. One lip does all the cutting work. Hole is larger than the drill.

Length of lips are unequal. Hole is much larger than drill. Lips undergo excessive wear.



For ordinary use, the angle of the lips and the centre line of the drill should be 59°. Both lips should be equal in length.

POINTS FOR SPECIAL PURPOSES

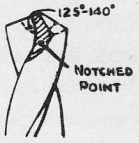
General drilling in steel

Bakelite, Wood-Fibre

Brass

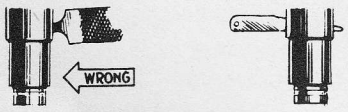
Steel forgings

Medium cast iron

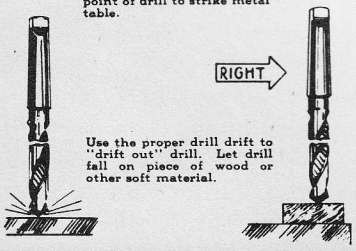


Crankshaft drilling or for use on turret lathes and screw machines.

TO REMOVE DRILL FROM SOCKET OR SLEEVE

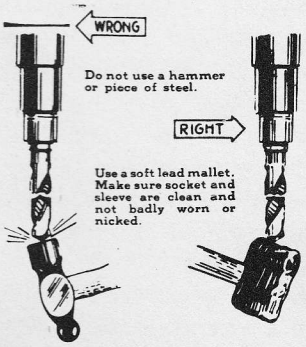


Do not use a file or wedge to pry out drill. Do not allow point of drill to strike metal table.



Use the proper drill drift to "drift out" drill. Let drill fall on piece of wood or other soft material.

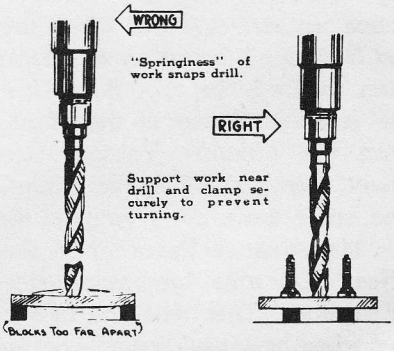
TO DRIVE A DRILL INTO A SOCKET OR SLEEVE



Do not use a hammer or piece of steel.

Use a soft lead mallet. Make sure socket and sleeve are clean and not badly worn or nicked.

SUPPORT WORK NEAR POINT OF DRILL APPLICATION



"Springiness" of work snaps drill.

Support work near drill and clamp securely to prevent turning.

DRILLS ARE SCARCE-USE 'EM RIGHT!

HOW TO MASTER THE VACUUM GAUGE

It's got more tricks than a barrel of monkeys. Learn to use it now.

They used to tell the story of Cpl. Willie McHugh whose squad was the best-behaved in the Division. Willie never had any trouble.

One day the sergeant asked Willie how he did it, and Willie answered, "Oh, I can read their minds."

When the sergeant denied this on the grounds that you can't read a vacuum, Willie just smiled and pulled forth a gauge about the size of an alarm clock with a long rubber hose attached to it.

It was a vacuum gauge.

Now although that story about what Willie did with it sounds a little like noise, the things you can do with a vacuum gauge are remarkable and no end helpful.

It shortcuts diagnosis and leads like a bloodhound to the probable sources of engine trouble; in the hands of a mechanic who knows how to use it, the vacuum gauge is a crystal ball — sees all, knows all and tells all.

The reason, of course, is that the vacuum in an engine must behave in a certain way under certain conditions. Any misbehaviour is a clue to trouble. The vacuum gauge detects misbehaviour.

Specifically, the vacuum gauge, attached to any manifold outlet, can tip you off to worn rings, weak valve springs, gum on the valves, inoperative distributor advance — mechanisms, clogged muffler, leaky gaskets and manifolds, poor idling mixture adjustment, and a kitful of similar aches and pains.

Just hook up the hose, watch the gauge needle dance, and go to work happy.

But first, of course, there's a couple of things you'll have to know:

How is vacuum formed in the engine? What disturbances and trouble cause reactions on the vacuum gauge? What are the reactions?

Well, vacuum is formed on the downward stroke of the piston that draws fuel into the cylinder. The exhaust valve is closed and the intake valve is open — the intake manifold and the cylinder are as one single chamber. The piston moves downward increasing the area of the chamber which reduces the pressure to a point well below atmospheric pressure.

And there you have your vacuum.

The natural and expected thing is for outside air to rush in and fill the vacuum. If the air finds its way into the chamber by the approved or sunshine route— through the throat of the carburetor, past the butterfly valve and into the manifold and cylinder, all's well and good. If it leaks in from any other place, engine operation suffers.

That's where your vacuum gauge steps in. Attached to any manifold outlet, it indicates the possible sources of the leak. We said sources because the gauge can only give you an approximation, it narrows the possibilities down — which is a lot better than hunting high and low over the vehicle for the trouble.

The reactions on the gauge are many and varied and to the experienced or interested mechanic, read almost as simply as McGufty's First Reader. Our little chart on the next page is about as complete a catalogue of vacuum-gauge reactions as you could want.

Before using your vacuum gauge, there are a couple little things you've got to check. Does your vehicle have a combination fuel and vacuum-booster pump (for the windshield wipers)?

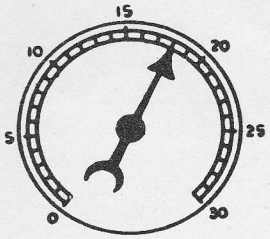
You'll have to disconnect the booster pump from the manifold before attaching the gauge. Otherwise your readings won't be dependable. Either plug the connection or attach the gauge at this point for the test.

Are your head-nuts, manifold-nuts, and vacuum connections from the manifold tight? Tighten them. Leakage at any of these points not only upsets the air-fuel ratio, but also produces low vacuum readings.

(Continued on Page 38)

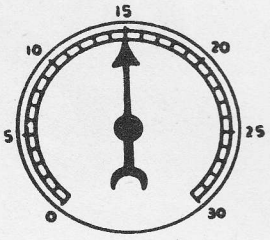
VACUUM GAUGE REACTIONS

STEADY NEEDLE BETWEEN 17-21



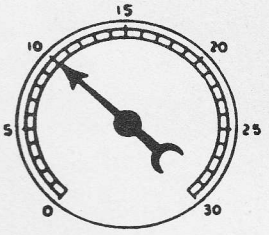
1. Normal motor.

STEADY NEEDLE BETWEEN 14-16



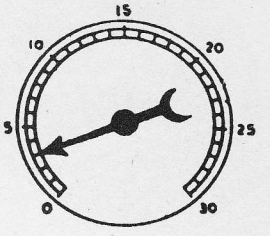
2. Poor rings or oil. Late ignition timing. (Possibly some needle motion).

STEADY NEEDLE LOW VACUUM



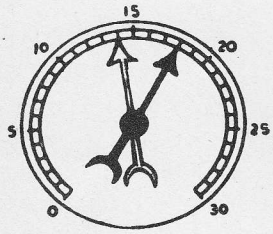
3. Loose valve guides. See also Nos. 2 and 4.

STEADY NEEDLE LOW VACUUM



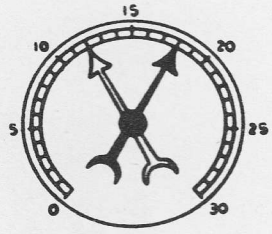
4. Intake manifold or heat riser leak. Also see Nos. 2 and 3.

IRREGULAR DROP NORMAL VACUUM



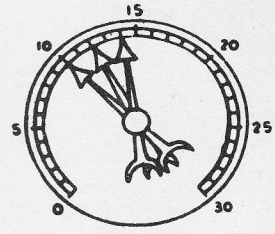
5. Gummy valve stems. Mixture too rich or too lean. Occasional plug miss. Internal carburetor trouble. Also see No. 8.

REGULAR DROP NORMAL VACUUM



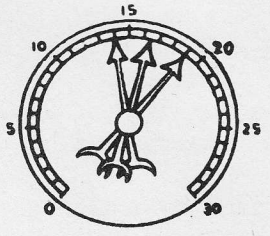
6. Valve held open. Valve chipped, or burnt, or leaks. Warped valve seat. Head gasket leak.

SLOW MOVEMENT LOW VACUUM



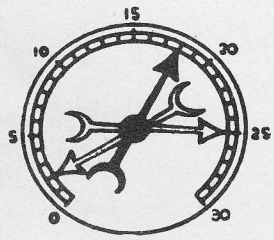
7. Late valve timing. Also see No. 8.

SLOW MOVEMENT LOW VACUUM

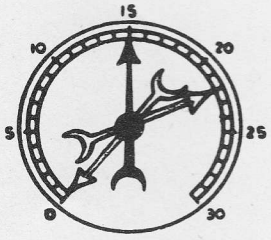


8. Carburetor out of adjustment. Plug gaps too close. Points not synchronized. See also No. 5.

OPERATING MOTOR BY QUICKLY OPENING AND CLOSING THROTTLE

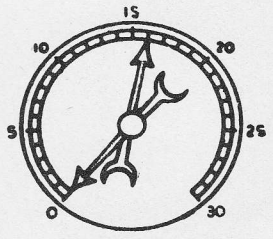


9. Needle drops to 2 when opening throttle, and rebounds to 25 when closing, indicates normal motor.



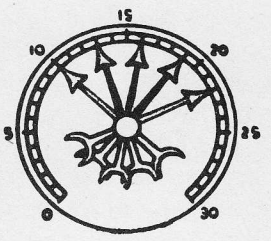
10. Needle drops to 0 when opening throttle, and does not rebound to 25 on closing. Poor rings, pistons, or oil.

MOTOR RACING OR IDLE



11. Normal reading at start, but gradually drops, indicates choked muffler.

MOTOR RACING



12. Wide variations of needle increasing with motor speed indicate weak, or broken valve springs.

Give your vacuum gauge every break.

To the tune up man, the vacuum gauge is a friend indeed. It saves time wasted on a tune-up job where the compression factor in the cylinders is not up to scratch. Trying to tune an engine with low or uneven compression in the cylinders, is like trying to tune a nickle whistle — it can't be done.

And, of course, you can't cure a low or uneven compression by a tune-up, so take your vacuum gauge in hand and find the deficiency before attempting a tune-up.

You can make the vacuum-lift test before tune-up without starting the engine, for the readings are taken at starter speed. Attach the gauge to the manifold, disconnect the throttle-shaft connector link, turn the throttle-arm stop screw out so that the butterfly valve is completely closed, and then with the ignition switch off, spin the engine with the starter. If everything is in good shape, the hand will lift to 17 or more inches of vacuum — which is another way of saying the compression factor is normal. Don't worry about the slight waver in the needle — it's due to the valve overlap which is registered at this low rpm.

With the compression factor declared by your vacuum gauge to be normal, go ahead with your tune-up. (Incidentally, vacuum gauge readings vary with altitude above sea level, because atmospheric-pressure decreases with altitude. Deduct approximately 1 inch from suggested readings at sea-level, for each one-thousand feet above that point that the reading is taken).

But what if the vacuum gauge doesn't give you the high sign? What if the needle doesn't lift to 17 or more inches?

Trouble.

If the needle fails to rise above the five-inch mark — the intake manifold, manifold gaskets, or the heat riser sleeve is faulty or leaking — and should be removed and checked.

If the hand moves up to a point between 10 and 15 inches, and vibrates back and forth badly — look for a blown cylinder-head gasket or bad valve-condition. By attaching a compression gauge to the cylinders individually, you'll more likely be able to isolate the weak sisters before pulling the head.

Other vacuum gauge tests are made with the engine running. For instance if a tachometer is not available for setting engine idle-speed adjustments, jack the rear wheels up clear of the floor, and with the transmission in high gear, turn the throttle stop-screw until the speedometer reads 7MPH. Then adjust the idle air-needle until you get the highest reading possible on the gauge. Check the speedometer and see if the speed is above or below the 7 MPH minimum. If it has drifted, reset the throttle stop-screw to bring it back to that speed.

Here's some more tests:

Having secured the proper idle-mixture by setting the engine idle-speed to the highest vacuum-reading, race up the engine quickly, then release the throttle arm. The vacuum-gauge needle should drop to 2 inches, and recoil to 24 inches or more. If the needle recoil is less than 24 inches, chances are you've got diluted oil or leaky piston rings.

Rev up the engine to about 30 MPH and hold the throttle stationary. Does the needle at first drop back, then gradually climb up to a peak of from 1 to 2 inches higher than the idling reading and remain steady? No? The automatic advance mechanism in the distributor is off the beam. Inspect it.

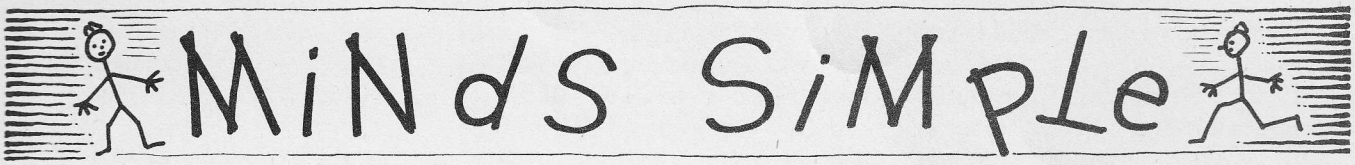
Hold the throttle arm steady at about 30 MPH engine speed. If the needle fluctuates rapidly between 10 and 21 inches, you've got weak valve-springs that aren't closing the valves properly. (The fluctuations will increase with the increased engine-speed).

Worn intake-valve guides are notorious power and oil thieves. They introduce oil from the valve chamber into the firing chamber and at the same time allow atmospheric pressure to enter the manifold. This lowers the vacuum reading just like a leaky manifold gasket. To distinguish between a manifold gasket leak and a valve-guide leak, try this stunt: Pour heavy oil over the intake manifold gaskets. This will seal them temporarily. If the vacuum reading does not immediately rise, the valve guides are pretty certain to be the offenders.

Your vacuum gauge can set ignition-timing surprisingly close when a neon timing-light is not available: With rear wheels off the floor and transmission in high gear, set the throttle stop screw until speedometer shows 14 to 15 MPH, (no more). Loosen the distributor-lock-plate screw and turn the distributor body in retard direction until the needle reaches 16 or 17 inches. Then turn the body in the opposite direction to advance until needle reaches its highest point and starts to fluctuate ahead. Hold it at this point for an instant, then turn the distributor body back slowly — just enough to remove the fluctuation. At the highest point on the gauge where the needle holds steady, lock the screw. This is the best timing setting. Prove it to yourself by a short road-test.

You can uncover a clogged muffler with your vacuum gauge. It'll be indicated by a normal vacuum reading when the engine is first started, and then a gradual fade or drop in the reading, as the muffler area is filled up with

(Continued on Next Page)



As I'm leavin' the mess hall this morning, Half-track McGinnis staggers over to me wavin' the November issue of CAM. Finn, Mechy, he says with a bright, glazed look in his eye, how about you and me going over to the canteen, dry, and getting ourselves dogs, hot, two, with all accessories including mustard, hot, relish, green, and roll? Or, he adds before I can collect my wit, would you care to accompany me to the Workshop, M.T., to see my beautiful Tool, cutting-off, right hand, with 3/32 by 9/16 in. cutter? Or, — Hold on, Half-track, I manages to insert, you sound like you're in reverse. You sure that dame didn't give you a conclusion of the brain when she slugged you last night?

In a fraction of a second the gleam leaves Half-track's eye and he assumes his normal altitude. Why no, Mechy, it's just that I don't savvy why this here man's army don't call a spade a spade instead a shovel. Why don't it say a right hand cutting-off tool with a 3/32 by 9/16 in. cutter instead a Tcol comma cutting-off comma right hand comma etc. etc. etc.? I just don't get the pernt and a lot a other guys don't either! Maybe, he adds with a question in his voice, there's some good illogical reason for this double talk — like for instance, was there once a general what learned to read his 3 R's backwards?

Well, Half-track really had me stumped up a tree there because I'd never given this here Army nomenclature much forethought. So I says to Half-track, instead of fumigatin' all over the place and gettin' yourself stewed why don't you enquire about the reason? For the moment Half-track transposes me with a dull piercing glare. Then he states, to be perfectly Frank and Ernest I didn't think there really was no good reason. But I'm game. Who do we enquire of? So I recommends the Captain who happens to be passing not more than within an arm's throw from where we're standing.

The Captain looks at Half-track like for once he's pleased. I'm glad you asked that, Half-track, he points out. There's a good reason for this nomenclature. The Army handles hundreds of thousands of pieces of equipment, parts and tools. They must have some fool-proof way to identify all this equipment for their records so that they know what they've got and what they need and so that anyone who has anything to do with handling this stuff would know what the other guy is talking about and vice versa. So, in writing about such equipment they give the name of the machine or part or tool first and then other information which describes it more in detail — like Grader, road, motorized — or drill, electric 3/4-in. etc. etc. That's why you have to fill out requisitions the same way, so the man at the depot can tell at a glance what you want and can route the requisition to the right place. Is that clear?

Why yes, Captain, that clarifies the whole thing. Only, Half-track adds, that upside down talk sure makes it tough on guys like me who got minds comma simple comma without accessories!

VACUUM GAUGE—(Cont'd)

exhaust-gases, and back-pressure is formed.

Among the lesser uses of the vacuum gauge, is the windshield-wiper-hose test at the wiper motor. The reading should be the same at that point as at the manifold. Leaky or restricted hoses can be quickly located in this manner.

With the vacuum gauge, you can give a very convincing demonstration showing that a fast and heavy foot on the accelerator does nothing but waste gas.

Hook the gauge in at the windshield wiper motor and drive off in the truck, jamming the accelerator to the floor-boards and feeding it too much gas as so many drivers do. There will be a big drop in the vacuum, the needle will read low. An excessive drop in the vacuum reading means gas is being wasted and an exhaust analyzer attached to the exhaust pipe would confirm this.

But you can state it as a rule that excess vacuum drop means wasted gas.

The vacuum gauge can answer a multitude of questions if the operator has his head plugged in while making use of it. The fact that it won't take you by the hand, and lead you to the actual trouble on a moment's notice is apt to be a little disturbing at first. But a short term of practice and study will prove that the instrument can say 'hot' and 'cold' with amazing accuracy, when tracing down a complaint.

Now pull your vacuum gauge out of that pile of grease rags where you threw it when they first gave it to you, dust it off, and use it.

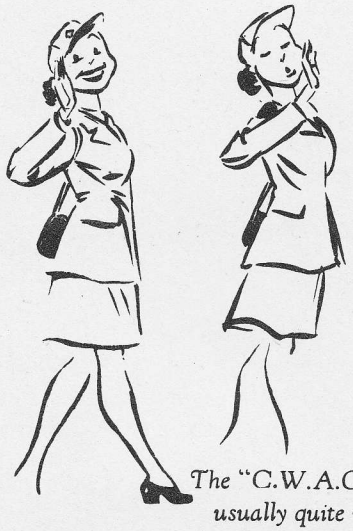
◆ ◆ ◆

The "HI-YA BUB" type
—very chummy and informal

The "HO-HUM" type
—a beastly bore, what!

The "SUPREME EFFORT" type
—and sorry about the whole thing!

The "TELEPHONE BOOTH" type
—or "a Helicopter flies like this!"



The "C.W.A.C.-LUTE"—
usually quite regimental
—the expression depends on how tall—dark and handsome.

What's in a SALUTE?

The salute is the services' own symbolic way of paying respect—like a handshake or a "Good morning". It's plain everyday courtesy in correct army style.

There are a great many versions of the origin of the salute. All of them sound more or less feasible.

In ancient Rome it was the custom of visiting military people to raise their hands, palms open, to show that they carried no lethal weapon concealed with malicious intent — and in the period when Knights wore armour, the mortality rate was high due to them not being able to recognize friend from foe with the visor of the helmet closed. Life was often

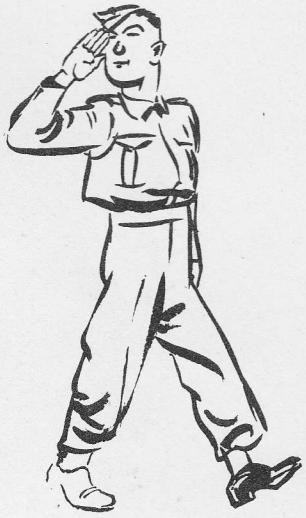
The "VIGOROUS" type
—and great exercise!

The "ORDER ME FIVE" type
—can't get rid of a pre-war beverage room habit!

The "WOOD CHOPPER" type
—or "he went that way"!

The "VIBRATTO" type
—there's spring steel in that there arm!"

The "UNDECIDED" type
—will probably scratch his nose five paces later!



OF COURSE . . . .
There is a correct way!

dependent on a snappy raising of the visor — sort of a "don't shoot — it's me, chum" idea.

What's all this got to do with Maintenance? We suggest it has plenty. Fitters, mechanics and drivers are soldiers — a good fitter, mechanic or driver is usually a good soldier — and good soldiers can be spotted quicker than a wink by the way they salute. By the same token then, a driver's calibre can be judged by the way he salutes — it's a reflection of his whole attitude to the job.

The "Ho Hum" type will find it just as much of a bore to carry out his CPMS 1, 2 and 3 as he does to salute. "Undecided" will probably just scratch his nose instead of checking the air cleaner when he should and "Hi ya Bub" will probably do his when he feels like it, which may not coincide with operational requirements.

You know what we mean because you've seen 'smart' units — they are smart in appearance, smart on parade, their equipment is smart and efficient. It's a habit with them and they're proud of it — you can tell by the way they salute.

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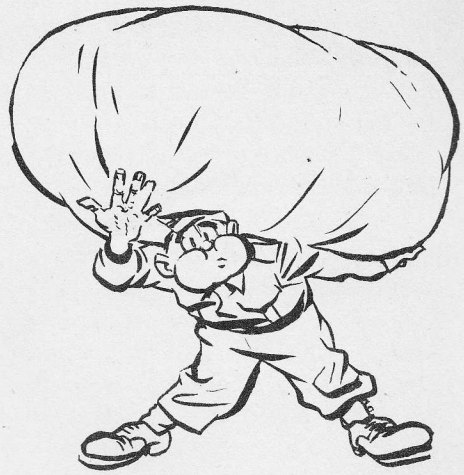
For B.F.s

MURDER . . . BY CHOKING



" . . Come up and try it sometime . . "

Of all the toys provided (unintentionally) by a well-meaning manufacturer for a B.F. to play with, the choke, or carburetor strangler, takes the prize. The complete B.F. loves to pull a knob out — especially if he can choose a time when by all the rules it should be pushed in and left in.

The choke is provided to make it easy for you to start a cold engine. Sometimes a label on the vehicle tells you to push it in again as soon as possible. The instruction books always tell you to push it in again as soon as possible. Common sense should tell you — but maybe it isn't as common as we thought.

Let us explain what the choke does and why it has to be used intelligently.

A petrol engine operates by burning a mixture of petrol and air. The mixture is composed of so many parts of air and so many parts of petrol, and the "ingredients" are measured by weight.

Just a minute, we can hear you saying. Air doesn't weigh anything. Are you telling us, or are we telling you? The office in which this is being written is twenty by forty by twelve feet high. If it were possible to cram all the air from it into a sack, do you think you could carry it? Come up and try it sometime. It weights just over 700 lbs. or, better than a third of a ton!

But that is by the way. For full throttle performance, the mixture should consist of about 13 parts of air (by weight) to one part of fuel. For part throttle performance, in an efficiently designed carburetor, the ratio can be thinned out to 16 or 17 parts of air (by weight) to one part of fuel.

These mixture ratios are satisfactory after an engine is warmed up. That is why we make use of various devices to shorten the warming up period.

But — during the warming-up period, and for cold starting, these mixture ratios are much too lean. The colder the mixture, the richer it must be to burn. When the outside air temperature is at zero, a one-to-one mixture ratio is required. In other words, if you wanted to burn up the air in the office we mentioned just now, and the temperature was at zero, you would need 700 lbs. of petrol.

Talk about being wet, that's wet with a vengeance. All the same, if you mean to start an engine at this temperature, you must have a one-to-one ratio. Only for an instant, of course, but you must have it — and it's given to you by the choke. They also make it impossible for you to carry on running with this very wet mixture

" . . . An occupation where destruction is a virtue . . . "

by fitting a device which automatically changes the ratio and makes it much leaner as soon as the engine starts to run. If they didn't, the engine would peter out almost immediately, anyway.

The leaner mixture thus automatically provided while the choke is still pulled out is about 4 or 5 to one. And that is still very wet. So it's arranged that, when you push the choke half-way in, the ratio thins out a bit more—this time to about 8 or 9 to one.

So far, so good, But even at 8 or 9 to one, cylinder bore wear is excessive, and we dare not leave the choke in the half-way position longer than necessary. This, unfortunately — we've said it now and we won't go back on it — this, unfortunately, is where we have to rely on you. You have to push the choke in — right in — with your own fair hand. And if you mean to graduate from the "utter B.F." class, you'll learn to do it at the right time — which is as soon as the engine will run on the proper mixture.

Remember, with the choke half out, the mixture ratio is 8 to 1 for full throttle and 9 to 1 for part throttle. With the choke pushed in, it is 13 to 1 for full throttle and 17 to 1 for part throttle. There's a lot of difference, as the absent-minded mechanic said when he took hold of the wrong end of the soldering iron. And the result of that difference, if you misuse the choke, is to increase engine wear by between two and three hundred per cent.

The moral is, don't experiment with the choke control. If you can't stop playing with it, ask the sergeant to hand your vehicle over to someone else. Maybe he can find you a job making little stones out of big ones. That's an occupation where destruction is a virtue.

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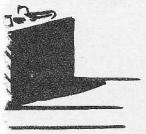
ATTERY



picture."

"B-bu . . . "

"You mustn't add anything to a battery with the idea of preventing it from freezing — for such chemicals will severely damage the battery — you'll freeze long before a fully charged battery will, so keeping it well charged is the only preventive for this trouble. But you probably don't care about these things—in your own callous way, you haven't spared a thought for that poor neglected battery."

"b-b-b . . . ", Sylvester staggered away, overcome with grief — a visibly shaken man . . .

. . . and a Battery on the rack seemed to give Sgt. O'Sweat a thankful look.

◆ ◆ ◆

Distilled Water

Distilled water has ruined more batteries than polluted water!

Nuts! sez you. Sure nuff, say we. Your battery goes dry and you haven't distilled water handy. What do you do? Just let it stay dry because somewhere you read that **only** distilled water should be added to batteries. So the battery gets ruined and you can blame the distilled water for it.

"Well, what am I supposed to do if my battery needs topping up

and I run out of distilled water?"

Well, the main thing to remember is to be sure and do something. Use tap water, stream water, any water that's clean and hasn't got old socks, tin cans and sand floating around in it. Use anything rather than let a battery go dry — which will ruin it quicker than impure water.

So — use distilled water when it's available — **but** any water you can drink can be put in your battery. Ordinary water will not affect the electrical characteristics of the battery, and even under extreme conditions it won't affect battery life more than 5 to 10% — which is a darn sight better than ruining the whole battery for lack of water.

Even heavily chlorinated water will not seriously harm a battery.

The initial filling of a new battery must be with distilled water for evaporation drives off only the water and leaves the impurities behind. After that, the possible accumulation of impurities from ordinary water is negligible.

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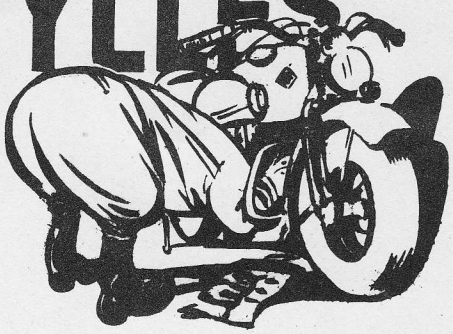
The specific gravity reading of a Battery is always taken as of 80°F. Any temperature below 80°F. calls for a correction in the reading you get on the hydrometer, of .004 for every 10°F. below 80°. The table gives you the correct readings — for instance, if the temperature is 10° above zero and you get a reading of 1.250 — the actual gravity (or true condition of your battery) is 1.222. Savvy?

TEMPERATURE CORRECTIONS FOR GRAVITY READINGS

Actual Gravity at 80°F. by temperature correction

Gravity at prevailing temperature	30°	20°	10°	0°	-10°	-20°	-30°	-40°	-50°
1.300	1.280	1.276	1.272	1.268	1.264	1.260	1.256	1.252	1.248
1.280	1.260	1.256	1.252	1.248	1.244	1.240	1.236	1.232	1.228
1.250	1.230	1.226	1.222	1.218	1.214	1.210	1.206	1.202	1.198
1.225	1.205	1.201	1.197	1.193	1.189	1.185	1.181	1.177	1.173
1.200	1.180	1.176	1.172	1.168	1.164	1.160	1.156	1.152	1.148
1.175	1.155	1.151	1.147	1.143	1.139	1.135	1.131	1.127	1.123
1.150	1.130	1.126	1.122	1.118	1.114	1.110	1.106	1.102	1.097
1.125	1.105	1.101	1.097	1.093	1.089	1.085	1.081	1.077	1.073

MOTORCYCLES



DON'T STICK YOUR NECK OUT — NOT ON A MOTORCYCLE ANYHOW!

A little booklet fluttered down onto our desk just the other day. After searching for about half an hour among the litter we finally found it and saw that it was a new Canadian Army Training Pamphlet No. 7 — The Training and Qualification of Motorcyclists, 1943.

We also found that it was a guide to Officers and N.C.Os. concerned with training of Motorcyclists, so we're going to pull a fast one on them and tip you off on something that may save you some hide and make you the golden haired boy with your instructor.

First of all — if you like motorcycles and want to have anything to do with them, don't pull any "flashy" riding stunts.

Instructors have orders to "punish severely even the smallest infraction of speed and safety laws" and the reason for this demand for strict discipline in motorcyclist's training is a good one—the prevention of **casualties.** More people have managed to kill or injure themselves by reckless or improper riding of motorcycles than any other vehicle. They can be a swift and versatile means of transport, and properly ridden, safer than most vehicles. The controls are simple and easy to operate — visibility is always good and our present Harley-Davidson W.L.C. has good brakes and road holding qualities. For these very reasons, there's a tendency, especially after you've done the first couple of hundred miles or so, to get reckless—to "see what she'll do."

O.K. You may know exactly what to do in any emergency, but you still have to **think** what to do before you get it done — you haven't got enough riding experience at two or four hundred miles to react automatically — you're a fraction of a second late — and over she goes.

But no matter how many miles you've ridden, don't ever lose your respect for a motorcycle — improperly used they're killers. Ridden with common sense they're fun — and a mighty useful army vehicle.

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The ANTI-FREEZE HYDROMETER

THE SOLUTION TO TESTING THE SOLUTION

"What's so tough about testing anti-freeze?"

Nothing — nothing at all — it's simple, like using a knife, fork and spoon — so long as you use 'em **right.** But did you ever try to cut a tomato with the handle of a knife — or drink soup with a fork? You've just got to know the rules of the game that's all — even when they're simpler then spending your pay. If you don't know the rules, you're going to have trouble — like cracked blocks, leaking radiators, burned out bearings and dirty looks from the sergeant.

You probably already know that sniffing and tasting the stuff that's in the rad won't tell you very much. It may remind you of the old days at McGuffy's Tavern but outside of those sordid memories you don't know much else — and you gotta know for sure — so you take advantage of modern science and use a Hydrometer. More important still — you use the right Hydrometer—one that's calibrated to give you a correct reading for the kind of anti-freeze you're using. In Canada that's not so tough as you'll normally only run into one kind — the "Prestone" type of Ethylene glycol, and the Hydrometer you'll get your mitts on will be like the one we had pose for the picture.

Now all you've got to do is remember a simple saying and you're all set. Simple saying quote — **Handle with Care** — unquote.

Hydrometers are mostly glass. When someone invents a transparent steel they'll probably use it to make Hydrometers with, but in the meantime, we've got to get along with the glass one. It goes without saying that glass rates poorly in the "bounce test".

Let's cast our gaze at the bottom part of the Hydrometer (Fig. 1). That's a plain ordinary thermometer—plain, that is, except it is graduated from 20°F to 160°F, and thereby hangs a tale — you can't take a reading if the solution in the rad is colder than 20°F or hotter than 160°. In fact, don't take a reading if the solution is below 60° — try and have the temperature around 120° — 130° as this temperature gives you the most accuracy.

In the upper part of the tube is a glass gadget that you can shake up and down because it's loose— but **don't.** It's the float and prefers a life of floating to bouncing. It has a scale in the tube part that goes just like your first reader at primary school — A, B, C, etc. (Fig. 2), and is weighted very carefully in the bottom to make it float at the exact level to tell the truth about Ethylene Glycol solutions. Thus, to obtain a correct test, the solution in the radiator must be thoroughly mixed and uniform, so that the stuff you draw up into the tester is the same as the solution throughout the Cooling System. So, if you've just added more anti-freeze, it's no good testing it until the motor has run long enough to thoroughly mix it — otherwise, you'll get an optimistic reading that will lead to trouble.

It's like putting ten bucks in the bank, and then writing a cheque for a hundred — looks good, but doesn't pay off.

From now on it's just a matter of knowing your alphabet and being able to count to ten.

Stick the rubber tube into the radiator filler hole, squeeze the bulb and draw up a charge into the tester (the glass one — not the one in uniform). Now squeeze it out again. Something wrong? No, we've just washed out any old solution that might have been lurking about in the hydrometer and also brought the parts up to approximately the same temperature as the solution we're testing.

Now we draw some more solution up — this time being careful that we get enough to raise the float but not sufficient to make the top of the float stem touch the

bottom of the bulb.

Comon, chillen — let's read.

First take the temperature from the thermometer (let's say it's 124°F. like in the picture). Now raise your pretty blue eyes to the float and note the letter which is at the level of the solution ('H' it is in Fig. 2). Now, Watson, the chart — right there behind the thermometer (Fig. 3). In the first vertical column we find 'H' (our float reading) and running our good eye across 'til we come to the temperature column that's closest to the reading we got on the thermometer (120°), the figure we now see is — 22° and you can take our word, and the Hydrometers', that this is the lowest point at which our coolant will not freeze. Why, it's too simple for words.

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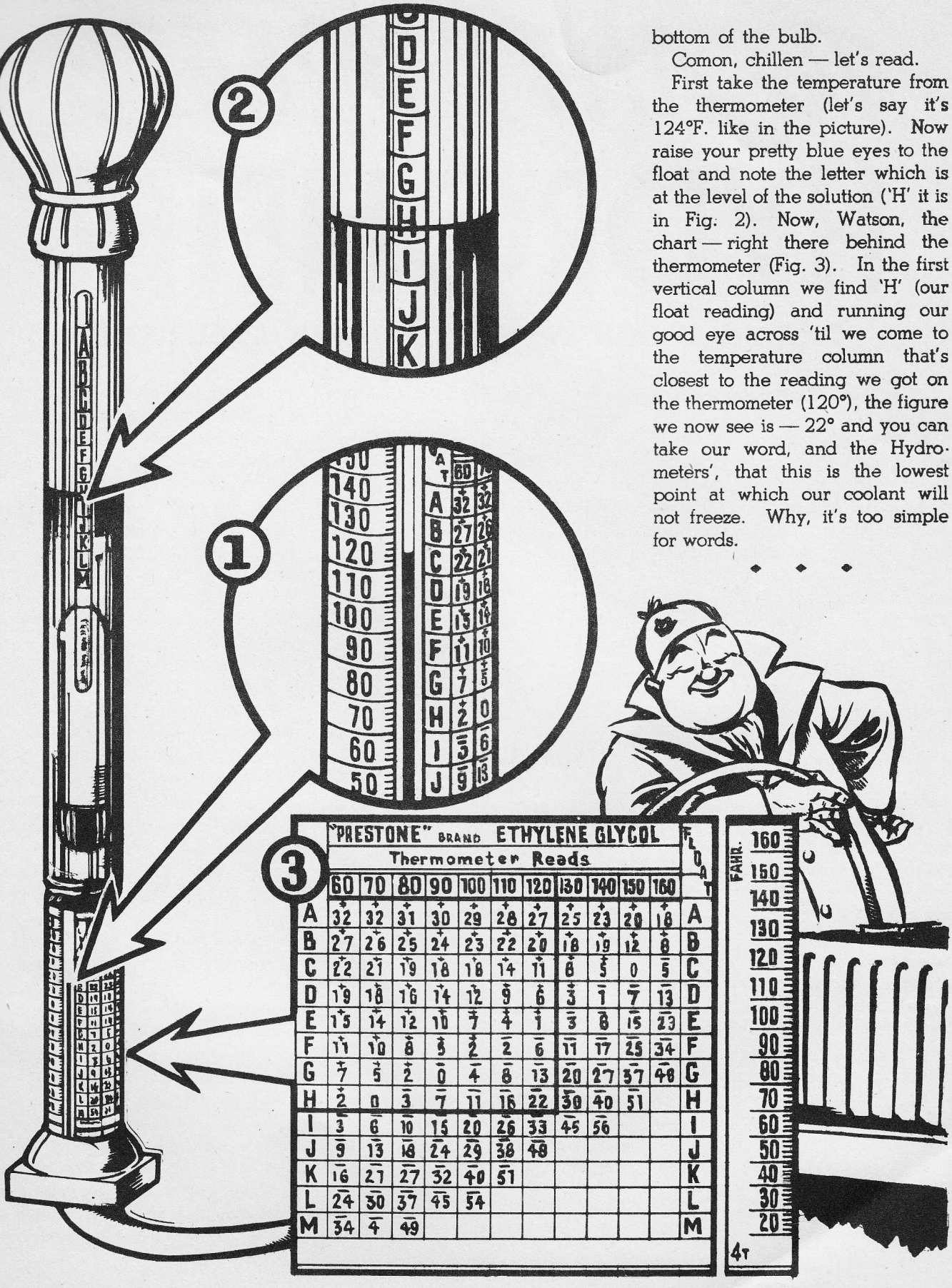

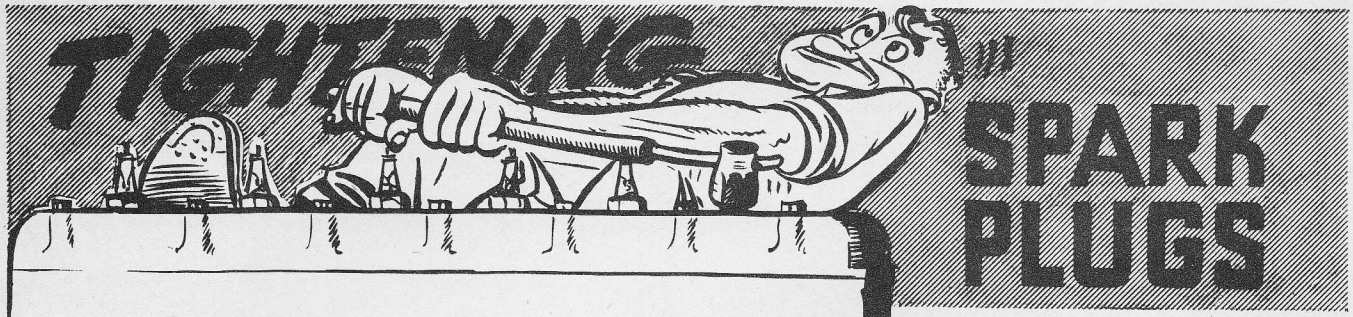

GAP TEST ON 6 SPARK PLUGS

Plugs	Gaps When Taken From Stock	Plugs Tightened in Head ½ Turn	Tightened In Head as Much as Possible	After Removal From Cylinder Head
No. 1	.023"	.023"	.026"	.025"
No. 2	.026"	.027"	.033"	.026"
No. 3	.023"	.024"	.034"	.032"
No. 4	.025"	.025"	.031"	.030"
No. 5	.026"	.026"	.033"	.033"
No. 6	.025"	.025"	.029"	.029"

Too little or too much Umph on the wrench is bad medicine for Plugs.

If you've never given much thought to the importance of correctly tightening spark plugs, we've got a little chart (above) that ought to shake you up a bit. It contains the results of some tests involving six plugs taken fresh from stock.

Correct tightening consists of giving the plug one-half turn after it has seated itself against the gasket. This gives a good seal but does not crush the gasket completely.

As the chart indicates (column 3), when the plugs were tightened correctly, the gaps were changed very little if at all — which is as it should be. But when the plugs were tightened in the head as much as possible (as they might be by somebody who didn't know his plugs from a hole in the ground), the gaps were altered considerably (column 4). They stayed altered considerably even after being again removed from the cylinder head (column 5).

This shows clearly how a citizen of the 1st or 2nd echelon might go quickly crazy trying to obtain (and retain) the proper gap in his spark plugs. He'd pull the plugs out, painstakingly give them the proper gap, and then when he'd install them again, in the full blossom of his ignorance, he would discover the gaps all out of kilter again.

Take a lesson from the chart, give your plugs the proper gap as prescribed by the maintenance manual and tighten them one-half turn after they've seated against a new gasket (and we do mean use a new gasket).

This tightening recipe not only fully compresses the seat gasket without causing the "gaposis shenanegins" shown in the table but also insures efficient heat transference from the plug to the engine head and cooling system.

Improper tightening can cause the plugs to cook — making for rapid burning of the electrodes, blistering of the insulators and probably pre-ignition.

By sticking to the above procedure you'll avoid the hard starting and poor engine performance that goes with improperly-gapped spark plugs, and the necessity for frequent cleaning and replacement caused by plugs being operated at incorrect temperatures.

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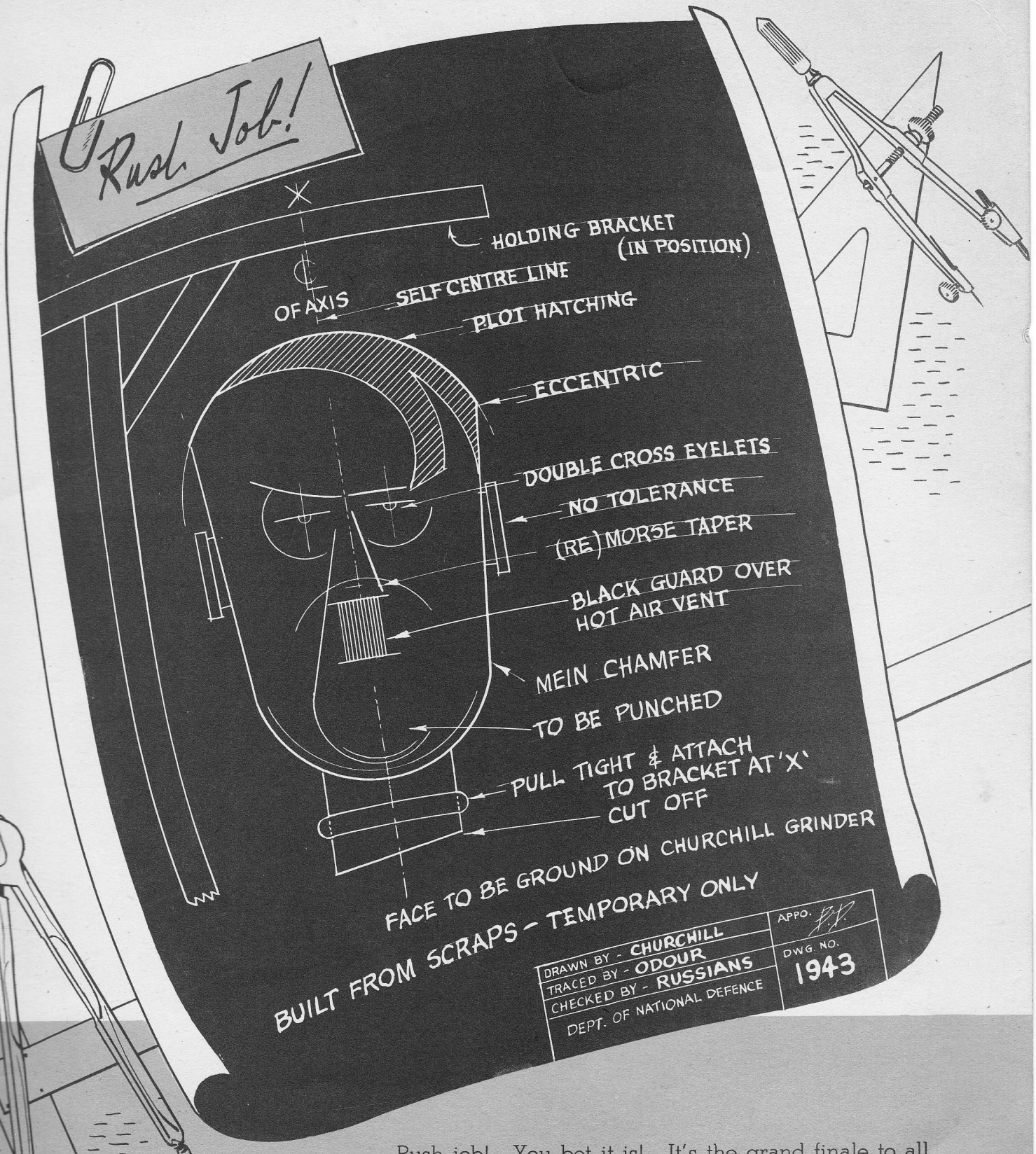

Rush job! You bet it is! It's the grand finale to all blueprints — take it as a symbol and execute it in a practical way. Every C.P.M.S. you do, every Driver's regulation you follow, every order you carry out enthusiastically and conscientiously speeds up the day when this blueprint will be finally tagged—

finished business.

Season's Greetings

and best wishes to you and yours for a happy leave